

## VATT Working Papers 86

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# The spike at benefit exhaustion in the Finnish labor market

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## Abstract

Many studies have found that the exit rate from unemployment increases in the vicinity of the exhaustion day of unemployment insurance benefits. The extent to which this spike is driven by job search behavior is important for assessing the distortionary effect of unemployment insurance. Card, Chetty and Weber (*American Economic Review* 2007; 97: 113–118) find a large spike in the exit rate from registered unemployment but only a very small spike in the job finding rate in Austria. We replicate their analysis using matched register data for Finland. We find a large spike also in the job finding rate at the time of benefit exhaustion, even though it is clearly smaller than the spike in the exit rate from unemployment benefits. In addition, we demonstrate difficulties in measuring the time to benefit exhaustion when the benefit entitlement can elapse at a reduced rate during activation measures or part-time working. Unless the remaining benefit entitlement is directly observed in the data, the resulting measurement error can lead to downward biased estimates of the spikes at benefit exhaustion.

**Key words:** Unemployment insurance, layoffs, hazard rates

**JEL classes:** C41, J64, J65

# 1 Introduction

One common finding in the empirical literature on unemployment insurance (UI) is a notable increase in the number of people leaving unemployment just when their benefits are about to expire (e.g. Moffitt, 1985, Katz and Meyer, 1990, Card et al., 2007, and Geerdsen et al., 2017). The spike in the exit rate from benefit receipt or from registered unemployment around benefit exhaustion is typically more pronounced than the spike in the job finding rate (Card et al., 2007). The latter spike can be viewed as evidence of the distortionary effect of UI as it suggests that some unemployed wait until their benefits expire before they return to work.<sup>1</sup> The size of the observed spikes varies across studies, reflecting differences in institutions (e.g. the maximum benefit duration and availability of other benefits after UI benefits have expired), how the unemployment spell is defined (the duration of benefit receipt, the duration of registered unemployment or the time to next job), and data quality (recall errors in survey data, truncated unemployment data when only UI records are available, whether job entries are directly observed or not, and measurement errors in potential benefit duration).

Card et al. (2007) review the previous evidence and provide new results on the shape of the hazard functions around benefit exhaustion using rich register data for Austria. They find a large spike in the exit rate of registered unemployment at benefit exhaustion but only a modest spike in the job finding rate. Using hazard model estimates they show that less than 1% of non-employment spells are manipulated to end around the time of benefit exhaustion. The difference in the spikes in the unemployment exit and job finding rates suggests that many unemployed register at the public employment service only to gain benefit eligibility. As such, the spike in the unemployment exit rate should not be interpreted as evidence of the moral hazard effect of UI as has been done in some previous studies. The researchers should instead focus on quantifying the size of the spike in the job finding rate around benefit exhaustion.

The aim of this paper is to replicate the analysis of Card et al. (2007) using matched register data for Finland. The Finnish benefit scheme is similar to the Austrian one in that the UI benefits are paid up to a certain maximum duration, after which a lower means-tested unemployment assistance is provided indefinitely. However, the maximum

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<sup>1</sup>Direct evidence on that type of behavior is provided by Krueger and Mueller (2010) who analyze time use survey data from the U.S. and find that the time spent in job search increases prior to benefit exhaustion among UI recipients and declines after benefits are exhausted. Boone and van Ours (2012) develop a search model where job applicants and firms can agree on a delay in job starting which produces the spike in the job finding rate at benefit exhaustion. They also present empirical evidence to support this prediction using data for Slovenia. DellaVigna et al. (2016) propose an alternative search model with reference-dependent preferences, where unemployed workers reduce their search effort after benefit exhaustion once they get used to the lower benefit level. They show that the model can capture the spike at benefit exhaustion in the Hungarian data.

duration of UI benefits is much longer in Finland (100 weeks compared to 20 or 30 weeks in Austria) while the level of the secondary benefit is lower.

Our data combines information from several administrative registers. We can make a distinction between exits to new jobs, recalls to previous employers, and exits to subsidized employment. An exceptional feature of our data is that we can measure accurately the length of the remaining entitlement period over the course of the unemployment spell. This is important because the benefit entitlement did not elapse during labor market training programs until 2009, and it elapses at a reduced rate when the benefit level is temporarily adjusted due to earnings from part-time work. As a result, the maximum number of days on UI benefits (and equivalent benefits) can exceed the maximum duration of UI benefits which is defined for the full benefit level, and the difference in the length of these two periods varies across individuals depending on their behavior. This institutional feature is not specific to Finland but applies to many other countries as well.<sup>2</sup> If the resulting measurement problem is ignored, the spike in the job finding rate at benefit exhaustion will be underestimated and the level of the job finding rate after benefit exhaustion will be overestimated. It is also important to make a distinction between job findings (reflecting job search choices by unemployed workers) and exits to subsidized employment (reflecting allocation decisions by employment authorities). This is because job placement programs are often targeted at those unemployed who have already exhausted their benefits or whose benefits are about to expire.

When the time to benefit exhaustion is accurately measured and exits to job placement programs are not treated as job findings, our results show that the job finding rate starts to increase two months prior to benefit exhaustion and peaks sharply in the last week of benefit eligibility, after which it drops below the pre-spike level. Although the spike in the job finding rate at benefit exhaustion is much larger than the one found by Card et al. (2007) for Austria, our results are quantitatively similar in the sense that only a tiny share of non-employment spells are manipulated to terminate close to the end of the entitlement period.

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<sup>2</sup>Specific training benefits are paid to UI recipients who participate in labor market programs for example in Norway (Gaure et al., 2012) and Sweden (Richardson and van den Berg, 2013). Such benefits are also paid in Austria, but Card et al. (2007) use data on unemployment spells from the years 1981–2001 when the active labor market policy did not yet play an important role in Austria. Part-time working on UI benefits prolongs benefit periods for example in France (Le Barbanchon, 2016) and the U.S. (McCall, 1996) but not in Austria.

## 2 Institutional setting<sup>3</sup>

To be eligible for unemployment compensation the claimant must be registered as an unemployed job seeker at the public employment service (PES). Members of unemployment funds with sufficient employment history qualify for 100 weeks of UI benefits (500 weekdays). This “employment condition” is met if the claimant had been working and making membership payments for 34 weeks within the past 28 months (43 weeks within 24 months before 2003) prior to the unemployment spell. Those who do not satisfy the employment condition can claim unused UI benefits from the previous unemployment spell. The benefit level is determined by the average wage over the review period of the employment condition. Unlike in most other countries, there is no cap in the benefit level, but the replacement rate declines rapidly with the past wage rate. Those who exhaust their UI benefits can claim a flat-rate labor market subsidy which is means-tested but available for an indefinite period for those in need.<sup>4</sup>

Prior to 2010, a specific training subsidy was paid to unemployed workers who participated in labor market training programs. The amount of the subsidy was equal to the unemployment benefit the worker would have otherwise been entitled to. In 2010, the training subsidy was abolished. Since then the program participants have received UI benefits. Before the 2010 reform, participation in the training program postponed benefit exhaustion by the length of the program period, in which case the maximum benefit duration exceeded 100 weeks (given that the training subsidy was equal to the UI benefit).

Those who take up a full-time job for less than two weeks (four weeks before 2003) or a part-time job may be entitled to partial UI benefits. Monthly income from such jobs reduces the UI benefit level by 50% of the earned amount. Workers on partial UI benefits are expected to continue their search for regular full-time employment in exchange for the benefits. During periods of partial benefits, the benefit entitlement elapses at a reduced rate corresponding to the ratio of the partial benefit level to the equivalent full benefit level.

To sum up, the length of the initial UI entitlement period at the start of unemployment spell varies between 1 and 100 weeks (or, more precisely, between 1 and 500 days) depending on the past employment history and the amount of unused UI benefits from past unemployment spells. We exploit this variation to separate the effect of the time

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<sup>3</sup>The description of the benefit rules applies to the years 2000–2013 which is the period covered by our empirical analysis. For a discussion of the current rules and changes over time see Kyrrä et al. (2017).

<sup>4</sup>The unemployed who are not members of the unemployment fund but satisfy the employment-history condition are eligible for a flat-rate basic unemployment allowance up to 100 weeks. This benefit is the same amount as the labor market subsidy but it is not means tested. In practice, this benefit type is of minor importance as the vast majority of workers are members of unemployment funds (in 2015, 90% of employed workers).

to benefit exhaustion from duration dependence. Moreover, even though the maximum benefit duration is 100 weeks, a worker can collect benefits longer if he or she receives partial benefits or participates in labor market training programs. This suggests that the initial benefit duration at the beginning of the spell minus the elapsed duration of registered unemployment, benefit receipt or non-employment are all noisy measures of the length of the remaining benefit entitlement. To deal with this measurement problem we exploit exceptionally rich data in which the remaining benefit entitlement is directly observed over time.

### 3 Data

One data source is the registers of the Ministry of Employment and the Economy which cover all individuals who are registered as job seekers at the PES. All unemployment benefit recipients are included as the registration is a prerequisite for benefit receipt. This data set provides information on job search spells and participation in labor market training and job placement programs, as well as demographic characteristics of job seekers. However, the data does not contain any information on receipt of unemployment benefits, nor on regular job spells.

The UI benefits are paid by unemployment funds, but each fund reports the benefits it paid out to the Insurance Supervisory Authority on a quarterly basis. From this authority we obtain data on UI benefits and earnings-related training subsidies. Along with daily benefits the records also include counters of the claimed full-time equivalent benefit days at the end of each quarter. With this information we can keep track of the number of days until the UI benefit will expire. From the Social Security Institution we obtain data on flat-rate benefits. Finally, we merge employment and earnings records from the Finnish Centre for Pensions, which is a statutory co-operation body of all providers of earnings-related pensions in Finland that keeps comprehensive records on job spells and earnings for the entire population (including also self-employed and civil servants).

We define the spell of unemployment as the time the worker collects unemployment-related benefits. More precisely, we combine sequential spells of benefit receipt whose distance is no longer than four weeks by treating such benefit periods as part of the same unemployment spell but ignoring the days without benefits between the benefit periods.<sup>5</sup> The time spent in labor market training programs is counted as part of the unemployment spell, as in Card et al. (2007). The resulting unemployment spell may thus include periods

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<sup>5</sup>Although the benefits are paid for five days a week, we count the weekends as part of the benefit period. As such, the benefit period is defined as the time from the first day of benefit receipt to the last day of benefit receipt, and such periods are then combined if they are close enough without including the gaps between them.



on different types of benefits. For example, a worker may first receive UI benefits, then the training subsidy for the duration of a labor market training course, and finally end up on the labor market subsidy after exhausting his or her UI benefits.

The unemployment spell may end with a transition to regular work, job placement program (i.e. subsidized work) or non-participation. We treat subsidized work as a distinct exit destination to distinguish the behavior of unemployed job seekers from the decisions of the employment authorities. This is important because job placement programs are often targeted at those whose benefits are about to expire. Card et al. (2007) focus on exits to regular employment, i.e. they do not consider exits to wage subsidy programs as job findings (such programs were rare in Austria during the period covered by their analysis).

The data from the PES also include information on exits to regular jobs that the applicants found themselves or through the referrals of the employment authorities. However, this information is incomplete as the exit reason is often missing for those who found a new job on their own.<sup>6</sup> For this reason, job findings are detected by comparing the ending dates of the unemployment spells and the starting dates of the employment spells. The employment records also include an identification code of the employer for each job spell, which we use to distinguish recalls to the previous job from exits to new jobs.

We use data on unemployment spells that started with receipt of full-time UI benefits in 2000–2013 after a job loss. We require that the duration of the previous job was no less than four weeks, the wage of the job was at least 500 Euros (in 2013 Euros) a month, and the job ended within four weeks prior to the benefit claim. The last condition eliminates voluntary quits which lead to a waiting period of three months, as well as temporary layoffs during which the employment contract remains in effect. We further limit our analysis to individuals between the ages of 20 and 54. Given that our data records are complete until the end of 2013, we censor spells that were in progress on December 31, 2013.

The final sample contains 769,989 unemployment spells for 373,439 individuals.<sup>7</sup> In

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<sup>6</sup>UI recipients (labor market subsidy recipients) claim their benefits in four-week periods from the unemployment fund (Social Security Institution). When the unemployed worker finds a job or leaves the labor force, he or she simply stops making benefit claims. Otherwise the worker has to pay back the unjustified benefit payments which we do observe in our data. On the other hand, the job seekers have no strong incentive to inform the employment authorities about the change in their labor market status (although the registration at the PES was the prerequisite for receipt of the *first* benefit payment) but they may simply stop keeping in touch with the employment authorities, in which case their registered unemployment spell at the PES will be terminated with some delay. A consequence is that the ending date of the registered unemployment spell is unreliable for some of the unemployed. For this reason we focus on the duration of benefit receipt, not on the duration of registered unemployment as in Card et al. (2007).

<sup>7</sup>We also drop a small fraction of spells with some peculiarities in the benefit records. These include 6,900 spells during which full-time equivalent UI benefits were received over 100 weeks, which should not

56% of the cases, the individual met the employment condition and was thus awarded a new 100-week period of UI benefits at the beginning of the spell. Nonetheless, the average length of the entitlement period is as long as 89 weeks, suggesting that most of those who did not meet the employment condition had experienced a short UI spell in the past. Most of the unemployment spells are quite short: 51% of the spells ended within three months, 73% within six months, and 88% within a year. The median and average unemployment duration are 13 and 24 weeks, respectively. Despite the much longer benefit periods in Finland, these spells are only slightly longer on average than the unemployment spells in the Austrian data. Most of the spells ended with a return to employment (71%), whereas exits to job placement programs (7%) and non-participation (12%) are less frequent outcomes.<sup>8</sup>

## 4 Results

Figure 1 depicts the weekly exit rate from unemployment for a sub-sample of those who met the employment condition and were thus eligible for the maximum benefit duration of 100 weeks at the beginning of the spell (431,101 spells). The peaks in the exit rate around two and six months are driven by recalls, i.e. exits to the same employer for which the individual worked before becoming unemployed (note that we dropped temporarily laid off workers with a valid employment contract from the sample). More importantly, at 100 weeks the unemployment exit rate exhibits a large spike that is 2.3 times the average exit rate in weeks 71–80 (“pre-spike level” hereafter). There is also a spike in the job finding rate that is 1.7 times the pre-spike level. Compared to the estimates of Card et al. (2007) for Austria, the spike in the unemployment exit rate at benefit exhaustion is of the same magnitude. However, the spike in the job finding rate is larger but sharper as it lasts only for one week; in the Austrian case, the job finding rate increases by 15% in the week of benefit exhaustion and by 20% for the next two weeks, amounting to a somewhat smaller cumulative effect over the 3-week period than the sharp 1-week spike in the Finnish data.

The spikes at benefit exhaustion in figure 1 underestimate the true spikes for two reasons. First, the 100th week of unemployment corresponds to the last week of UI eligibility only for those individuals who did not participate in labor market training,

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be possible. If these spells were included in the analysis with the duration of UI benefits top-coded at 100 weeks, the spikes in the exit rates in the last week of benefit eligibility would be somewhat higher than those reported below. Thus, if anything, our results about the size of benefit-exhaustion spikes are conservative.

<sup>8</sup>To be classified as re-employed we require that the worker found a job that lasted for at least four weeks. This means that those who took up a shorter job and did not return to unemployment benefits within four weeks are classified as “unclear” exits. Likewise, the spells that ended in December 2013 are treated as unclear exits because our follow-up period is too short to determine the exit destination reliably in these cases.

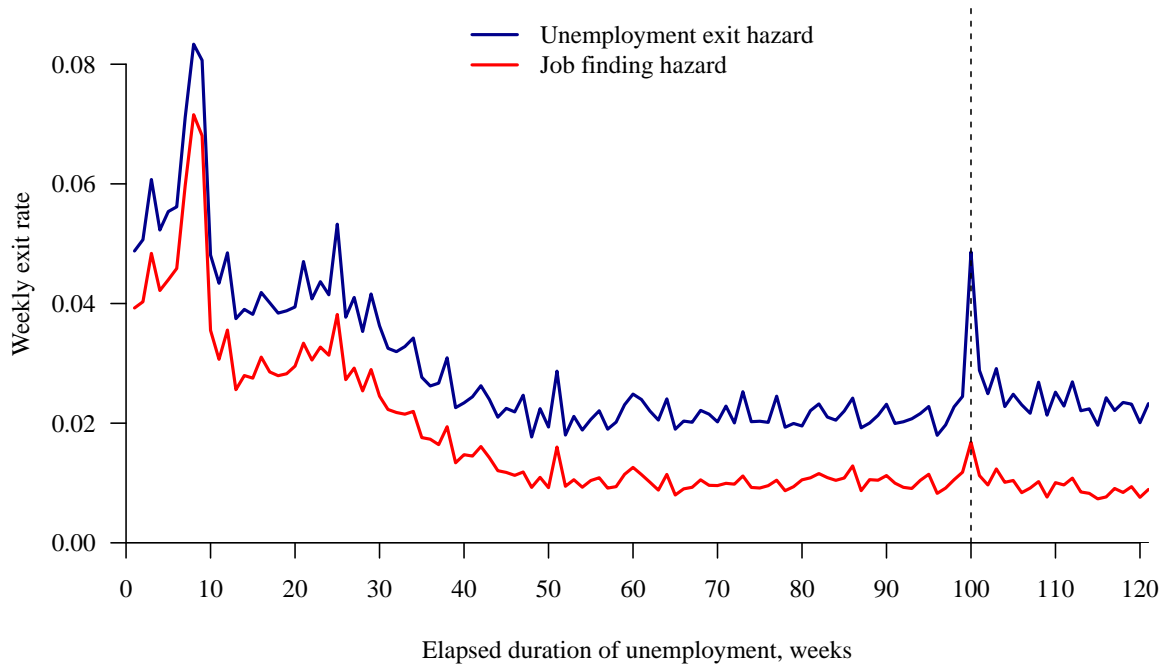


Figure 1: Unemployment exit and job finding rates as a function of time spent in unemployment for those entitled to 100 weeks of UI benefits at the beginning of the spell

nor collected partial UI benefits. For the past training program participants the benefits do not expire after 100 weeks of unemployment but at a later point due to receipt of a training subsidy (which was abolished in 2010), smoothing the spike observed in the data. Working part time on partial UI benefits postpones the exhaustion day in the same way. Of those who are still unemployed after 99 weeks 14.3% have participated in a labor market training program and 2.2% have received partial benefits by that time.

Second, only a small fraction of UI recipients stay continuously unemployed for almost two years; 95% of individuals have already left unemployment before the spike. Unemployed workers often take up a short job and then return into unemployment. If such a job is too short to lead to renewal of the entitlement period, the worker can claim his or her unused UI benefits from the previous unemployment spell. If we follow the common practice and only include new UI spells in the analysis, most of the observations around benefit exhaustion will be discarded.

Figure 2 shows the exit rates for all spells that started with receipt of UI benefits, that is, we also include the spells in which the UI entitlement period at the beginning is less than 100 weeks. In this sample, the relationship between the elapsed duration of unemployment and remaining entitlement period is much weaker. The horizontal axis in the graph does not represent the elapsed duration of the current unemployment spell but

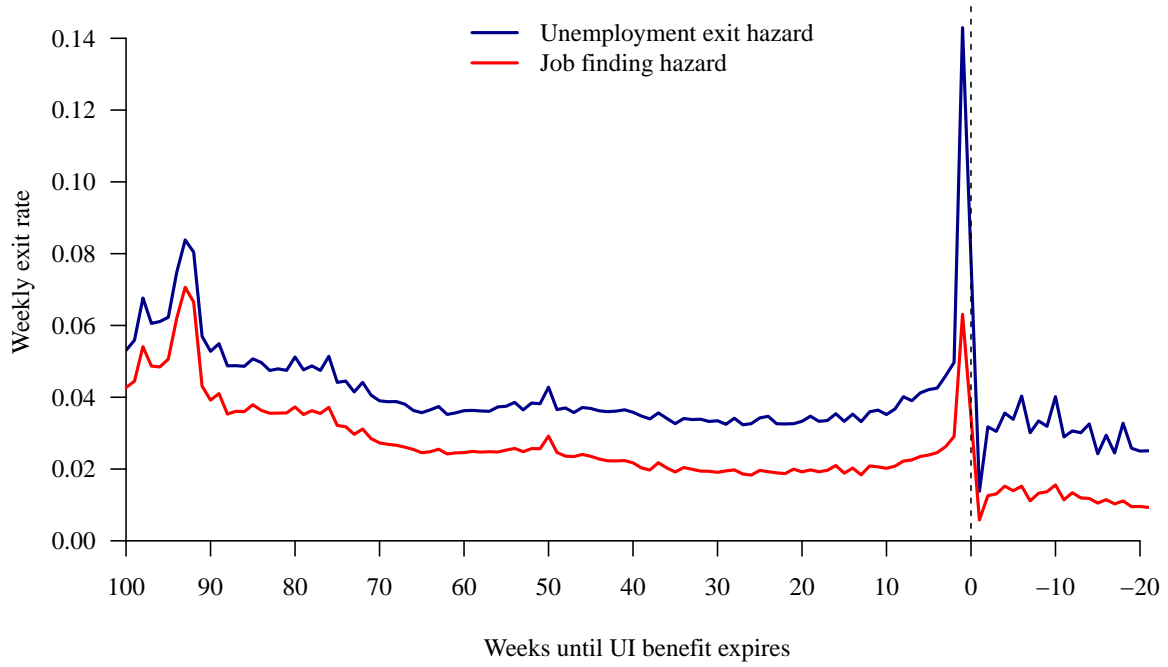


Figure 2: Unemployment exit and job finding rates as a function of time-to-exhaustion for all those entitled to UI benefits at the beginning of the spell (1 week of benefit entitlement = 5 full-time UI days)

the time to benefit exhaustion. The negative values indicate the weeks spent on labor market subsidy after benefit exhaustion. Both exit rates are roughly flat over the last 10–30 weeks of benefit entitlement but start to increase about 10 weeks prior to benefit exhaustion. The spikes in the last week of benefit eligibility are roughly twice of the corresponding spikes at the 100th week of unemployment in figure 1: 4.3 and 3.3 times the pre-spike level (the average hazard rate 21–30 weeks prior to benefit exhaustion) for the unemployment exit rate and job finding rate, respectively. Moreover, the job finding rate drops sharply once UI benefits have expired, ending up at an one third lower level than before the spike. It is evident that the “traditional” way of plotting the hazard functions in figure 1 fails to capture the shape of the exit rates around benefit exhaustion in the context of the Finnish data.

In figure 3 the overall unemployment exit rate is decomposed into exit rates to four different destinations. The spike in the exit rate to new jobs is somewhat larger than that to old jobs (3.6 versus 2.9 times the pre-spike level, respectively). In the first 10 weeks following benefit exhaustion the recall rate to the old job drops by over 40% whereas the exit rate to new jobs declines clearly less, by about 20%. The exit rates to subsidized employment and non-participation in the last week of benefit eligibility are 5.8 and 7.7

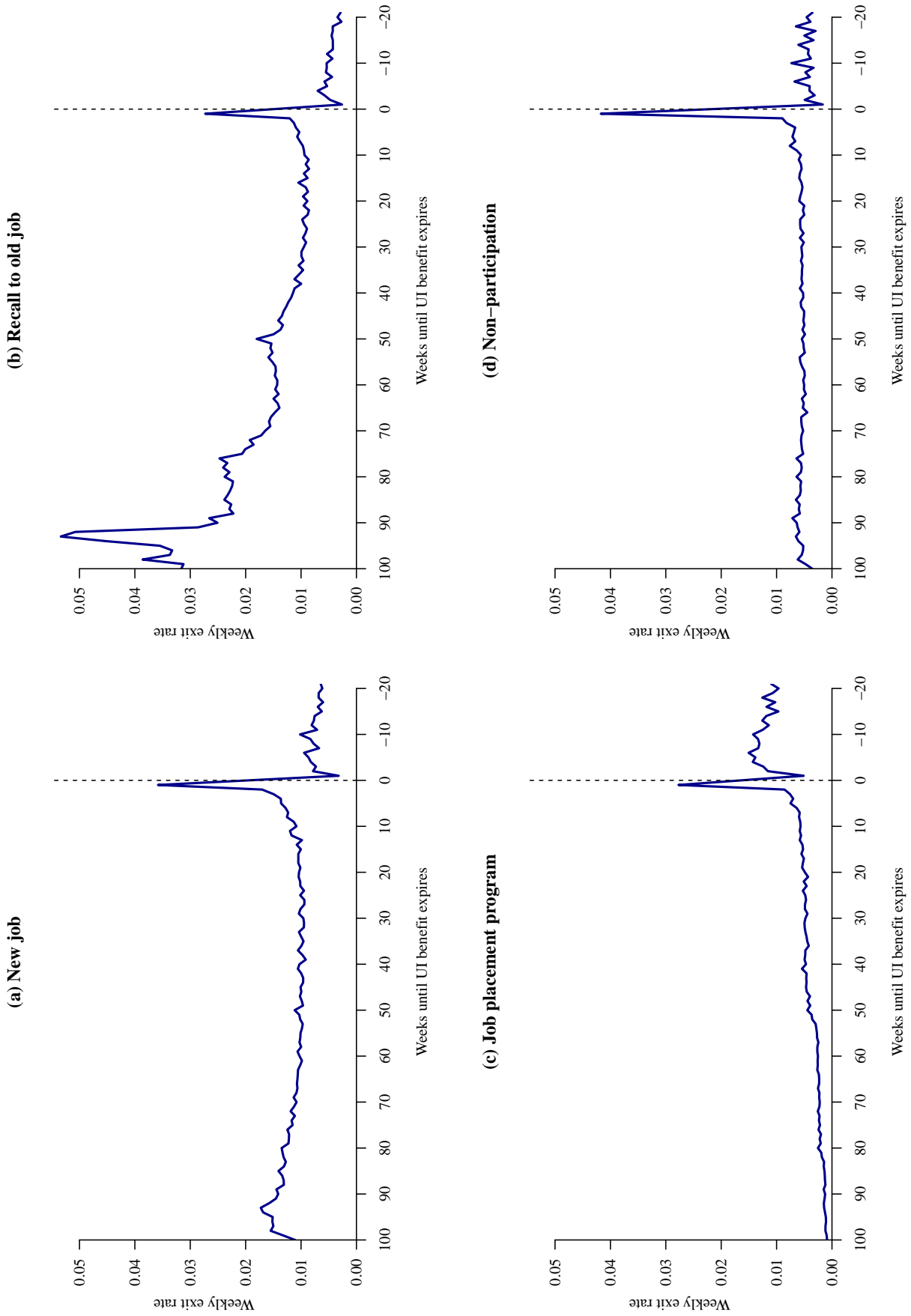


Figure 3: Unemployment exit rates as a function of time-to-exhaustion by exit destination for all those entitled to UI benefits at the beginning of the spell (1 week of benefit entitlement = 5 full-time UI days)

times the pre-spike level. During the first 10 weeks after the exhaustion of UI benefits, the exit rate to subsidized employment is some 160% above the pre-spike level. By contrast, the exit rate to non-participation is at a 20% lower level. Had we made no distinction between exits to regular employment and exits to job placement programs, the spike in the re-employment hazard in the last week of benefit eligibility would have been 3.8 times the pre-spike level (compared to 3.3 times the pre-spike level in figure 2) and there would have been no decline in the hazard rate after benefit exhaustion but a small increase of 7% over the first 10 weeks.

To quantify the size of the spike around benefit exhaustion in more detail, we estimate proportional hazard models of the following form

$$h(t | b(t), X(t)) = \lambda(t) \exp \{f(b(t)) + X(t)\beta\},$$

where  $t$  is the elapsed duration of unemployment (i.e. the number of the days received unemployment benefits, including weekends),  $\lambda(t)$  is the baseline hazard function that captures the duration dependence,  $f(b(t))$  is a function of the time-to-exhaustion (i.e. weeks of the remaining benefit entitlement or the weeks spent on labor market subsidy after the exhaustion of UI benefits) at unemployment duration  $t$ , and  $X(t)$  is a vector of control variables. We estimate the model for overall unemployment exits as well as for exits to different destinations using the data on all spells that started with receipt of full-time UI benefits (i.e. the data used for the hazard rates in figures 2 and 3). We censor a few very long spells at 140 weeks. To approximate the unknown baseline hazard in a non-parametric fashion we use a piece-wise constant function for  $\lambda$  which is allowed to vary freely across 4-week duration intervals.

We follow Card et al. (2007) and specify  $f$  as a set of dummy variables for the time-to-exhaustion. We choose 21–30 weeks of benefit entitlement as a reference category representing the pre-spike hazard level. The effect of elapsed unemployment duration and remaining benefit entitlement,  $\lambda$  and  $f$ , are separately identified due to two sources of variation. First, the length of the initial entitlement period  $b(0)$  varies across individuals. In other words, we exploit the fact that those UI recipients who do not satisfy the employment condition are only entitled to unused UI benefits from the previous spell. Second, the elapsed unemployment duration  $t$  does not change parallel with remaining benefit entitlement  $b(t)$  all the time because  $b(t)$  was constant during the labor market training programs before 2010, and because it elapses at a lower rate when the benefit level is reduced due to part-time working.

We report results from two specifications: one that only controls for the length of the initial entitlement period at the start of the unemployment spell  $b(0)$  (using a set of dummies for 10-week categories), and another with a number of additional covariates

Table 1: Hazard model estimates of the spike around benefit exhaustion

	Hazard rate for exits to											
	Unemployment exit hazard			Job finding hazard		New job		Previous job		Job placement program		Non-participation
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
17–20 weeks before	1.045 (0.013)	1.013 (0.014)	1.000 (0.018)	0.970 (0.018)	0.979 (0.024)	0.966 (0.025)	1.053 (0.025)	0.990 (0.025)	1.089 (0.035)	1.080 (0.036)	1.188 (0.034)	1.160 (0.034)
13–16 weeks before	1.089 (0.014)	1.043 (0.014)	1.016 (0.018)	0.972 (0.018)	0.975 (0.025)	0.953 (0.025)	1.107 (0.026)	1.011 (0.026)	1.171 (0.036)	1.159 (0.036)	1.286 (0.035)	1.242 (0.035)
9–12 weeks before	1.159 (0.014)	1.099 (0.014)	1.064 (0.019)	1.007 (0.019)	1.057 (0.026)	1.033 (0.026)	1.125 (0.028)	1.004 (0.028)	1.247 (0.037)	1.231 (0.037)	1.374 (0.037)	1.317 (0.037)
5–8 weeks before	1.359 (0.014)	1.270 (0.015)	1.222 (0.019)	1.139 (0.019)	1.192 (0.026)	1.162 (0.026)	1.332 (0.028)	1.147 (0.028)	1.432 (0.037)	1.414 (0.037)	1.780 (0.036)	1.683 (0.036)
3–4 weeks before	1.512 (0.019)	1.404 (0.019)	1.368 (0.025)	1.272 (0.025)	1.335 (0.033)	1.303 (0.033)	1.499 (0.037)	1.277 (0.037)	1.616 (0.047)	1.597 (0.047)	1.981 (0.047)	1.864 (0.047)
2 weeks before	1.709 (0.024)	1.587 (0.025)	1.561 (0.032)	1.450 (0.033)	1.558 (0.042)	1.532 (0.043)	1.672 (0.049)	1.406 (0.050)	1.925 (0.060)	1.909 (0.060)	2.419 (0.059)	2.276 (0.059)
1 week before	<b>4.825</b> (0.015)	<b>4.457</b> (0.017)	<b>3.323</b> (0.023)	<b>3.078</b> (0.024)	<b>3.206</b> (0.031)	<b>3.148</b> (0.032)	<b>3.711</b> (0.036)	<b>3.130</b> (0.037)	<b>6.085</b> (0.038)	<b>5.984</b> (0.039)	<b>11.081</b> (0.035)	<b>10.382</b> (0.035)
1 week after	0.533 (0.049)	0.462 (0.049)	0.341 (0.075)	0.300 (0.075)	0.317 (0.102)	0.296 (0.102)	0.395 (0.110)	0.317 (0.110)	1.331 (0.082)	1.242 (0.082)	0.486 (0.139)	0.439 (0.140)
2 weeks after	1.230 (0.033)	1.082 (0.033)	0.774 (0.051)	0.677 (0.051)	0.806 (0.066)	0.768 (0.066)	0.747 (0.082)	0.595 (0.082)	2.983 (0.058)	2.797 (0.058)	1.406 (0.085)	1.325 (0.085)
3–4 weeks after	1.290 (0.024)	1.123 (0.024)	0.877 (0.036)	0.758 (0.036)	0.817 (0.049)	0.747 (0.049)	1.031 (0.054)	0.808 (0.054)	3.387 (0.043)	3.198 (0.043)	1.053 (0.072)	0.993 (0.072)
5–8 weeks after	1.403 (0.019)	1.208 (0.019)	0.872 (0.029)	0.743 (0.029)	0.855 (0.038)	0.781 (0.038)	0.955 (0.046)	0.728 (0.046)	3.461 (0.036)	3.294 (0.036)	1.571 (0.051)	1.453 (0.051)
9–12 weeks after	1.422 (0.021)	1.212 (0.021)	0.954 (0.031)	0.800 (0.031)	0.910 (0.040)	0.833 (0.040)	1.073 (0.049)	0.790 (0.049)	3.180 (0.039)	3.077 (0.039)	1.590 (0.056)	1.462 (0.056)
> 12 weeks after	1.263 (0.014)	1.003 (0.014)	0.744 (0.020)	0.579 (0.020)	0.620 (0.025)	0.536 (0.025)	1.048 (0.034)	0.692 (0.034)	2.283 (0.030)	2.216 (0.031)	2.442 (0.035)	2.093 (0.035)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* Number of spells in the data is 769,989. The job finding hazard is the sum of the hazard rates to new jobs and previous jobs. Estimates shown are hazard ratios for the effect of time-to-exhaustion. The effects are proportional to the average hazard level 21–30 weeks before the benefit exhaustion. Standard errors are in parentheses. All models include the length of the initial benefit entitlement period as a control (10 dummies). Additional controls in models 2, 4, 6, 8, 10 and 12 include gender, age, education, occupation, the duration and wage of previous job, the sector of previous employer, the time spent employed 0–1 years ago and 1–2 years ago, the year and month of unemployment entry, as well as the time-varying indicators for those participating in labor market training programs and for those receiving partial benefits.

for gender, age, education, occupation, the duration and wage of the previous job, the sector of the previous employer, the time spent employed 0–1 years ago and 1–2 years ago, the year and month of the unemployment entry, and the time-varying indicators for the current participants of labor market training programs and for those receiving partial UI benefits. Although these models are unlikely to capture the causal effect of potential benefit duration,<sup>9</sup> we can distinguish the time-to-exhaustion effect from the duration dependence, which is the topic of the paper.

Table 1 shows the estimates of the coefficients of the time-to-exhaustion dummies as proportional effects on the reference level of the hazard function 21–30 weeks before benefit exhaustion (i.e. exponents of the coefficients). The estimates from the two specifications are very similar, albeit the size of the spike in the last week of benefit eligibility is typically slightly smaller in the specification with the large number of control variables. Overall, the results are broadly in line with the visual evidence in figures 2 and 3 where we did not control for the effect of the duration dependence. In the following discussion, we focus on the hazard estimates from the model with the control variables. As seen in column 2, the unemployment exit rate starts to increase 13–16 weeks prior to benefit exhaustion. This is due to increasing exits to job placement programs and non-participation (columns 10 and 12), whereas the job finding rate remains stable longer and starts to increase only 5–8 weeks before benefit exhaustion (column 4). The new job hazard and the recall hazard exhibit very similar patterns, both before and after benefit exhaustion (columns 6 and 8).

From column 6 we see that the spike in the job finding rate in the last week of benefit eligibility is 3.1 times the pre-spike level. The spikes in the exit rates to job placement programs and non-participation are much larger, 6.0 and 10.4 times the pre-spike level respectively (columns 10 and 12). However, since these exit routes are less common than regular employment, the spike in the overall unemployment exit rate – 4.5 times the pre-spike level (column 2) – is not much larger than the spike in the job finding rate. That is, unlike in the Austrian case, the increase in the job finding rate plays an important role in

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<sup>9</sup>In fact, part of the variation in  $b(0)$  can be regarded as exogenous. Kyrrä et al. (2017) find no evidence that workers in the Finnish labor market would time their unemployment entry according to the employment condition rules, suggesting that there is random variation in potential benefit duration at the time of unemployment entry among workers whose past employment history is just above or below the employment condition threshold (i.e. regression-discontinuity type of variation). Moreover, since the threshold value of the employment condition was shortened in 2003, workers with 34–42 weeks of employment history during the past two years, who satisfied the new condition but not the old one, are entitled to benefits for different duration depending the year of unemployment entry (i.e. difference-in-differences type of variation). However, it is difficult to construct an accurate measure of the past employment weeks of the employment condition because not all employment are counted for and because the review period of two years may be extended for various reasons. As such, the causal inference using either regression-discontinuity or difference-in-differences type of variation in potential benefit duration would probably call for the instrumental variables methods which are not easily implemented in the context of hazard models.



explaining the spike in the unemployment exit rate in the Finnish labor market. Except for the exit rate to job placement programs, all the exit rates drop by at least 50% in the week after benefit exhaustion. Over the first 2–12 weeks after benefit exhaustion, the unemployment exit rate is some 10–20% above the pre-spike level. This is explained by elevated exit rates to job placement programs and non-participation, as the job finding rate remains at a somewhat lower level than before the spike.

Compared to the findings of Card et al. (2007), the spike in the unemployment exit rate at benefit exhaustion in Finland is roughly twice of the spike in Austria (4.5 vs. 2.4 times the pre-spike level). However, the difference in the spikes in the job finding rates is much larger (3.1 vs. 1.2 times the pre-spike level). Card et al. (2007) find that the exit rates are flat until the last week of benefit eligibility, and then remain elevated for two weeks in the case of the job finding rate and twelve weeks in the case of the unemployment exit rate once the benefits have expired. By contrast, we find that the exit rates increase several weeks *before* the end of the entitlement period, as predicted by job search models (e.g. Mortensen, 1977). After benefit exhaustion, the unemployment exit rate shows a similar pattern to the Austrian case but the job finding rate drops below the pre-spike level rather than remaining at a higher level. To some extent these differences between the studies arise from the different measures of the spell length: the duration of benefit receipt (until next job) for Finland vs. the duration of registered unemployment and the time between job spells for Austria. The waiting period before the benefit payments start and a possible delay between the last benefit payment and the start of the next job can affect the location of the spike by a few weeks. Nevertheless, it is evident that the job finding rate increases more strongly around the time of benefit exhaustion and explains a larger part of the overall increase in unemployment exits in Finland than in Austria. But this does not necessarily mean that the strategic timing of job starts to coincide with benefit exhaustion is a qualitatively important phenomenon even in Finland.

Using their hazard model estimates Card et al. (2007) estimate that less than 1% of non-employment spells end in the last week of benefit eligibility or in the following four weeks due to the spike in the job finding rate. Another reason for the small role of the spike is that most of the spells terminated before the end of the benefit entitlement period (80% in Austria). This is a relevant point also in our case: because of the exceptionally long entitlement period in Finland, only 7% of the spells were still in progress during the last 8 weeks of benefit entitlement, which is the time interval when the job finding rate is elevated. In light of this observation, it is not surprising that only 1.3% of the spells ended with a transition into employment during the last 8 weeks of the entitlement period, and 0.3% of the spells in the last benefit week. It follows that the spike in the job finding rate close to benefit exhaustion cannot have a large effect on the average unemployment

duration despite its large size.

To address this question more closely we compute the counterfactual job finding hazard over the last 8 weeks of benefit entitlement by setting the job finding rate at its reference level, i.e. the level 21–30 weeks prior to benefit exhaustion (we scale the weekly job finding rates by hazard ratios shown in column 4 of table 1). Keeping the exit rates to job placement programs and non-participation at their true levels, this exercise implies that 0.9% of the spells would have ended with a transition to employment during the last 8 weeks of benefit entitlement in the absence of increases in the job finding rate over the last weeks of the entitlement period. Stated differently, an extra 0.4% of the unemployment spells end in the last 8 weeks of benefit entitlement because of the strategic timing of job starts.

## 5 Conclusions

We found a large spike in the exit rate out of UI benefits just before the benefits are about to expire. A notable part of this spike is attributed to transitions to employment, which indicate that some unemployed wait until their benefits expire before they take up a new job or return to their previous employer. The size of this group compared to the entire population of UI recipients is however very small, and thereby the effect of their behavior on the average unemployment duration is negligible. This conclusion is in line with the findings of Card et al. (2007) for Austria, although the mechanism is slightly different. We found a much higher increase in the job finding rate around the time of benefit exhaustion but its effect is mitigated by a smaller fraction of the population still unemployed close to the end of the entitlement period, which is not surprising given the much longer entitlement period in Finland.

Moreover, our analysis also illustrates that, depending on the institutional setting, quantifying the spike in the job finding hazard at the time of benefit exhaustion may be difficult due to measurement problems, and it may call for matched register data with detailed benefit records in addition to data on employment spells.

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